Formation and properties of ternary silicide $(Co_xNi_{1-x})Si$ thin films

Hong-Xiang Mo Xin-Ping Qu Jian-Hai Liu Guo-Ping Ru Bing-Zong Li
Dept. of Electron. Eng., Fudan Univ., Shanghai , China;

This paper appears in: **Solid-State and Integrated Circuit Technology, 1998. Proceedings. 1998 5th International Conference on**

Meeting Date: 10/21/1998 - 10/23/1998
Publication Date: 21-23 Oct. 1998
Location: Beijing China
On page(s): 271 - 274
Reference Cited: 6
Number of Pages: xxi+973
Inspec Accession Number: 6319144

Abstract:
A ternary silicide $(Co_xNi_{1-x})Si_2$ formed by Ni and Co thin films or Ni, Co and Ti thin film deposited on a Si(100) substrate is studied. The results show that a highly conductiv silicide $(Co_xNi_{1-x})Si_2$ can be formed by solid phase reaction of either Ni/Co/Si or Co/N structures. The resistivity of the silicide films is in the range of (15-20) μΩ.cm. The formation temperature of $(Co_xNi_{1-x})Si_2$ is rather low compared with the disilicides of and Ni. XRD data show that $(Co_xNi_{1-x})Si_2$ has a CaF_2 structure and its lattice constan between that of $CoSi_2$ and $NiSi_2$. $(Co_xNi_{1-x})Si_2$ can also be formed by rapid thermal annealing of a Co/Ni/Ti/Si multilayer structure. A quite low χ_{min} value is shown by RBS/channeling investigation. The joint has a better epitaxy quality as compared with that without a Ti interlayer. It is more uniform and has a good thermal stability and l resistivity. Experiments with two step annealing and chemical selective etching demonstrate that a self-aligned silicided contact and a gate-level interconnection structure can be formed on Si wafers

Index Terms:
Rutherford backscattering channelling cobalt compounds dielectric thin films electrical resist etching integrated circuit interconnections lattice constants nickel compounds rapid thermal annealing thermal stability 15 to 20 muohmcm $CoNiSi_2$-Si RBS Si Si(100) substrate XR channeling chemical selective etching formation temperature gate-level interconnection struc lattice constant multilayer structure rapid thermal annealing resistivity self-aligned silicided contact solid phase reaction ternary silicide thermal stability thin films